Richmond Lake

Site Description

Location
Water designation number (WDN)	03-0008-00
Legal description	T124N-R64W-Sec.1,12,13,14,25,36
	T125N-R65W-Sec.19,22,23,24,25
County (ies)	Brown
Location from nearest town	5 miles north and 4 miles west of Aberdeen

Survey Dates and Netting Information
Survey dates	August 7-9, 2012 (FN, GN)
	October 4, 2012 (EF-WAE)
Frame net sets (n)	18
Gill net sets (n)	6
Electrofishing-WAE (min)	60

Morphometry
Watershed area (acres)	103,128
Surface area (acres)	829
Maximum depth (ft)	29
Mean depth (ft)	15

Ownership and Public Access
Richmond Lake is an impoundment managed by the SDGFP. Two primary public access sites are present on Richmond Lake; these are located on the south (recreation area) and southeast (spillway access) shorelines and are maintained by the SDGFP (Figure 2). Richmond Lake is managed by the State of South Dakota and lands adjacent to the lake are under state and private ownership.

Watershed and Land Use
The Richmond Lake watershed is a sub-watershed within the Moccasin Creek watershed and is predominately comprised of agricultural lands with a small municipality (Leola) being located in the northwestern portion of the watershed. Much of the shoreline of Richmond Lake is rimmed with homes and cabins which are connected to a central sewer collection system (McLaury 2006).

Water Level Observations
Water levels on Richmond Lake are not monitored by SDDENR.

Fish Management Information
|	
Primary species	Black Crappie, Bluegill, Walleye
Other species	Black Bullhead, Channel Catfish, Common Carp, Green Sunfish, Largemouth Bass, Northern Pike, Pumpkinseed, Rock Bass, Smallmouth Bass, Spottail Shiner, White Bass, White Sucker, Yellow Perch
Lake-specific regulations	Largemouth/Smallmouth Bass: minimum length 15"
	Walleye: minimum length 15"
Management classification	warm-water permanent impoundment
Fish consumption advisories	none
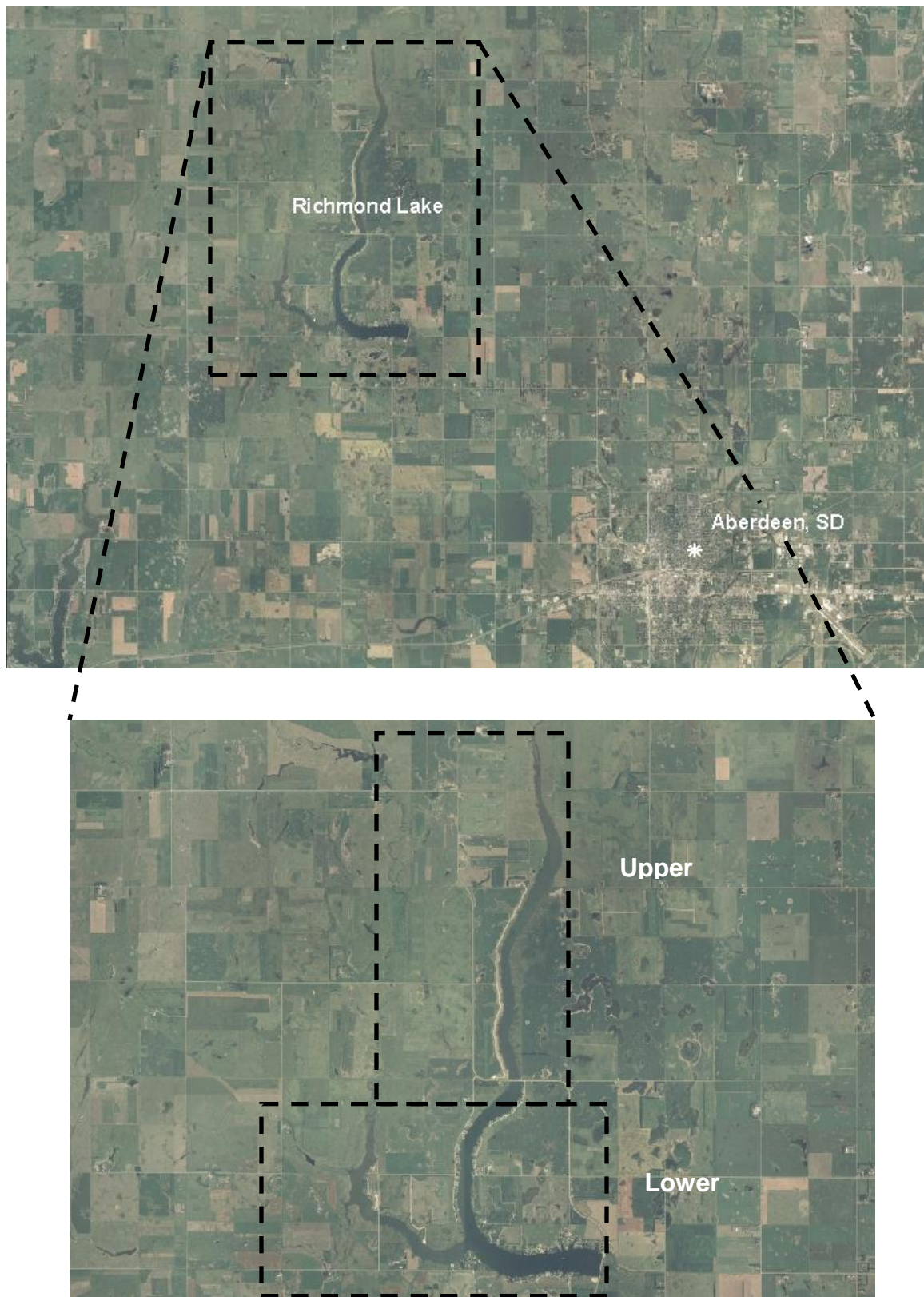
Figure 1. Map depicting location of Richmond Lake from Aberdeen, Brown County, South Dakota. Also included are upper and lower designations.
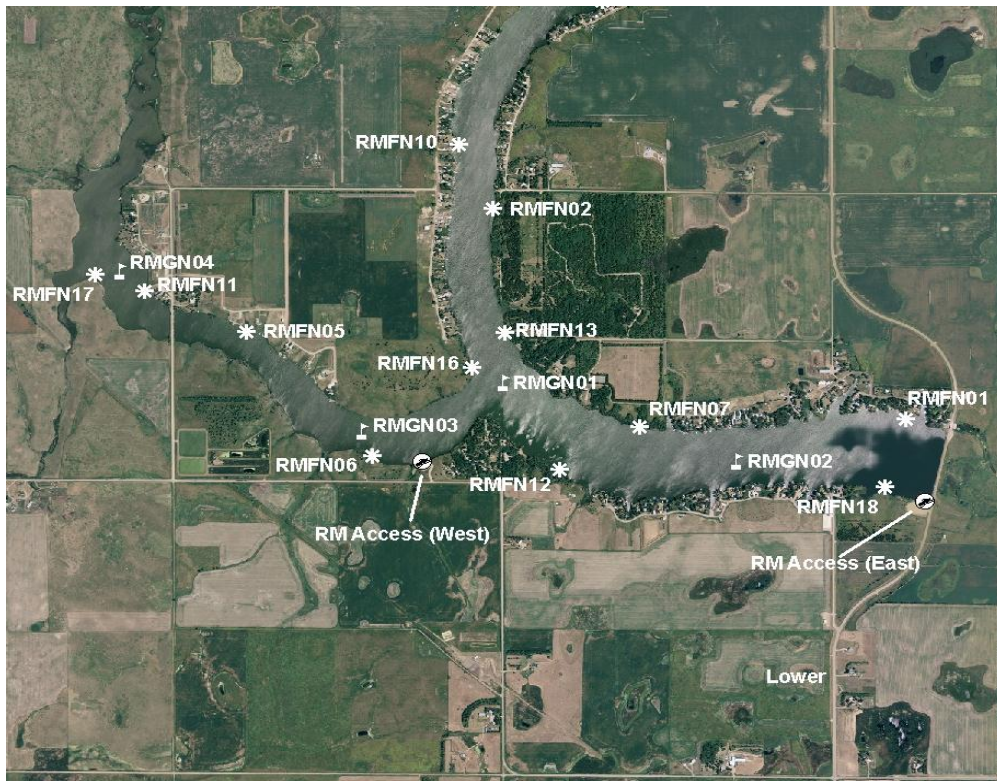
Figure 2. Map depicting access points and standardized net locations for Richmond Lake, Brown County, South Dakota. RMFN= frame nets, RMGN= gill nets

Management Objectives

1) Maintain a frame net mean CPUE of stock-length Black Crappie ≥ 10, a PSD of 30-60, and a PSD-P of 5-10.

2) Maintain a frame net mean CPUE of stock-length Bluegill ≥ 25, a PSD of 30-60, and a PSD-P of 5-10.

3) Maintain a gill net mean CPUE of stock-length Walleye ≥ 20, a PSD of 10-40, and a PSD-P of <5.

4) Maintain a frame net mean CPUE of stock-length Black Bullhead ≤ 100.

Results and Discussion

Richmond Lake is an impoundment located 5 miles north and 4 miles west of Aberdeen, South Dakota. Richmond Lake was constructed by the damming of Foot Creek in the 1930's by the Works Progress Administration. Foot Creek (west arm) and an unnamed tributary (north arm) are the major surface water inlets to the lake. Water exits through an outlet on the east side of the lake flowing into Foot Creek and eventually draining into the James River (McLaury 2006).

Overall, as many as 16 species of fish have been collected from Richmond Lake. Currently, Richmond Lake is managed as a Bluegill, Black Crappie, and Walleye fishery. A high-density (i.e., mean gill net CPUE $\geq$ 20 stock-length Walleye/net night) Walleye population should be maintained to effectively impact Black Crappie and Bluegill population size structures through predation.

Primary Species

Black crappie: A substantial die-off of Black Crappie, the cause of which is largely unknown, occurred in Richmond Lake during the summer of 2010. As a result, few adult Black Crappies were captured in the 2010 frame net catch (Table 2). In each of the past two surveys (2011 and 2012), the mean frame net CPUE has increased (Table 2). In 2012, the mean frame net CPUE of stock-length Black Crappie was 8.8, but remained below the minimum objective ($\geq$ 10 stock-length crappie/net night; Table 3).

Length-frequency analysis indicated that Black Crappie captured in the frame net catch ranged in TL from 12 to 22 cm (4.7 to 8.7 in) and suggested the presence of at least two year classes (Figure 3). The PSD was 66 and above the management objective of 30-60; while no preferred-length crappie were captured (Table 1; Table 3; Figure 3).

No age and growth information was collected during 2012. Black Crappie in the frame net catch had mean Wr values that exceeded 100 for all length categories (i.e., stock to quality) sampled, with the mean Wr of stock-length Black Crappie being 108 (Table 1). No length-related trends in condition were apparent in 2012.

Bluegill: The mean frame net CPUE of stock-length Bluegill was 51.3 (Table 1) and above the minimum objective (≥ 25 stock-length Bluegill/net night; Table 3). Since 2003, the mean frame net CPUE has fluctuated from a low of 23.8 (2005) to a high of 60.7 (2011; Table 2). Currently, relative abundance is considered high.

Bluegill captured in the frame nets ranged in TL from 9 to 22 cm (3.5 to 8.7 in), had a PSD of 78 and a PSD-P of 17 (Figure 4). Both the PSD and PSD-P were above the objective ranges of 30-60 and 5-10 (Table 3), indicating a population skewed towards larger individuals (Figure 4).

Since 2007, otoliths have been collected from a sub-sample of frame net captured Bluegill. In 2012, age structure information indicated the presence of six year classes (2005, 2007-2011; Table 4). Year classes produced in 2008, 2010 and 2011 were the most represented and comprised 26%, 42%, and 21%; respectively, of bluegill in the frame net catch (Table 4).

Bluegills in Richmond Lake typically reach quality-length (15 cm; 6 in) by age 2 (Table 5). Since 2007, the weighted mean TL at capture of age-3 Bluegill has ranged from 169 to 194 mm (6.7 to 7.6 in); while the weighted mean TL of age-4 Bluegill has ranged from 181 to 200 mm (7.1 to 7.9 in; Table 5). In 2012, the weighted mean TL at capture of age-3 and age-4 Bluegill was 189 and 200 mm (7.4 and 7.9 in; Table 5). Bluegill in the frame net catch exhibited a slight decreasing trend in condition as TL increased; however, mean Wr values remained above 105 for all length categories (i.e., stock to quality) sampled. Condition of Bluegill, as indexed using Wr values may have been influenced by spawning activity.

Walleye: The mean gill net CPUE of stock-length Walleye was 5.8 (Table 1) and below the minimum objective (≥ 20 stock-length Walleye/net night; Table 3). Since 2003, gill net mean CPUE values have ranged from a low of 1.5 (2008) to a high of 26.2 (2003; Table 2). The gill net CPUE represented a decrease from the 8.3 observed in 2011 (Table 2), but still indicated moderate relative abundance.

Walleye captured in the gill net catch ranged in TL from 20 to 64 cm (7.9 to 25.2 in), had a PSD of 54 and a PSD-P of 6 (Table 1; Table 3; Figure 5). The PSD and PSD-P values were within management objectives and indicated a relatively balanced population (defined as PSD of 30-60 and a PSD-P of 5-10; Table 3). However, size structure indices should be interpreted with caution as sample size was low (i.e., 25 stock-length Walleye). In 2012, approximately 50% of walleye in the gill net catch exceeded the 38-cm (15-in) minimum length restriction (Figure 5).

The Richmond Lake walleye population has relied on large fingerling stockings to establish year-classes (Table 6; Table 8; Kaufman et al. 2008). In 2012, otoliths were collected from a sub-sample of walleye in the gill net catch and indicated the presence of five year classes (2002, 2007, 2008, 2010, and 2011; Table 6). The 2008 and 2010 cohorts, which coincided with large fingerling stockings, were the most represented and collectively comprised approximately 76% of Walleye in the gill net catch (Table 6;

Table 8).   No age-0 Walleye were captured during fall night electrofishing (Table 1), indicating a failed or weak naturally-produced year class in 2012. Therefore, 10,173 large fingerling Walleye were stocked in October (Table 8). Recruitment of the 2012 year class is currently unknown and will be assessed in future surveys.

Growth rates can be influenced by the length at which large fingerlings are stocked into Richmond Lake, as the size of stocked fish can vary from year to year. Walleyes typically achieve quality length and the minimum length limit (i.e., 38 cm; 15 in) during their fifth growing season at age-4 (Table 7). The 2008 year class, which has been the most abundant in recent surveys, had weighted mean TL at capture values of 305, 361, and 411 mm (12.0, 14.2, and 16.2 in) at ages 2, 3, and 4, respectively (Table 7). The 2010 year class had a weighted mean TL at capture of 309 mm (12.2 in) at age 2 (Table 7).   Mean Wr values of gillnet captured Walleye ranged from 83-103 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length Walleye being 84 (Table 1). No length-related trends in condition were apparent.

Other Species

Black bullhead: Black Bullheads were the most abundant fish species in the frame net catch (Table 1). The mean frame net CPUE of stock-length black bullhead was 236.3 (Table 1) and above the management objective ($\leq$ 100 stock-length bullhead/net night). The 2012 mean frame net CPUE represented a substantial increase from the 2011 CPUE of 39.1 and was the highest recorded since 2003 (Table 2).

Black Bullheads in the frame net catch ranged in TL from 15 to 26 cm (5.9 to 10.2 in) with the majority being $\leq$ quality-length (230 mm; 9 in). The PSD was 7 and the PSD-P was 0 (Table 1; Table 3). No age and growth information was collected in 2012. Mean Wr values of Black Bullhead captured in the 2012 frame net catch ranged from 87-88 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length bullhead being 88 (Table 1).

White bass: White Bass were first sampled in Richmond Lake during 2000 and appear to be well established (Table 2). Since 2003, mean frame net CPUE values have ranged from a low of 2.7 (2005) to a high of 59.7 (2006; Table 2). In 2012, the mean frame net CPUE of stock-length White Bass was 5.2 (Table 1).

Frame net captured White Bass ranged in TL from 19 to 37 cm (7.5 to 14.6 in), had a PSD of 97 and a PSD-P of 26. Limited recruitment and relatively fast growth to quality- and preferred-lengths contribute to the high size structure. No age and growth information was available in 2012. White Bass in the frame net catch exhibited a slight decreasing trend in condition as TL increased. Mean Wr values ranged from 85-90 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length fish being 89 (Table 1).

Yellow perch: Yellow Perch were the second most abundant fish species in the gill net catch, with a mean gill net CPUE for stock-length Yellow Perch of 11.8 (Table 1). The 2012 gill net CPUE represented an increase from the 2011 CPUE of 5.3 and was the highest recorded since 2003 (Table 2). Yellow Perch in the gill net catch ranged in TL from 13 to 23 cm (5.1 to 9.1 in), had a PSD of 61 and PSD-P of 0 (Table 1; Figure 8).

Yellow Perch populations are likely limited by habitat characteristics in Richmond Lake. However, relatively strong year classes produced in 2009-2011 have resulted in moderate relative abundance (Table 9). In 2012, the weighted mean TL at capture of age-2 and age-3 Yellow Perch was 194 and 216 mm (7.6 and 8.5 in; Table 10). Mean Wr values were $\geq$ 100 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length Yellow Perch being 100 (Table 1).

Other: Channel Catfish, Common Carp, Northern Pike, and White Sucker were other fish species captured in low numbers during the 2012 survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys on an annual basis (next survey scheduled in summer 2013) to monitor fish relative abundance, fish population size structure, fish growth, and stocking success.

2) Collect otoliths from Black Crappie, Bluegill, and Walleye to assess the age structure and growth rates of each population.

3) Stock Walleye (≈25 large fingerling /acre) if gill netting results warrant [i.e., low gill net CPUE of sub-stock (< 25 cm; 10 in) Walleye].

4) Maintain the 381-mm (15 in) minimum length limit on Walleye. The regulation is designed to protect smaller fish from harvest and increase average fish size (Lucchesi and Blackwell 2009).

5) Maintain the 381-mm (15-in) minimum length limit on Largemouth and Smallmouth bass. The regulation is designed to improve population density and/or size structure (Blackwell and Lucchesi 2009).

Table 1. Mean catch rate (CPUE; gill/frame nets= catch/net night, electrofishing= catch/hour) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) of stock-length fish for various fish species captured in experimental gill nets, frame nets, and electrofishing in Richmond Lake, 2012. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; CCF= Channel Catfish; COC= Common Carp; NOP= Northern Pike; WAE= Walleye; WHB= White Bass; WHS= White Sucker; YEP= Yellow Perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
Frame nets								
BLB	236.3	136.6	7	1	0	---	88	1
BLC	8.8	3.4	66	6	0	---	108	<1
BLG	51.3	26.5	78	2	17	2	113	1
CCF	0.1	0.1	100	---	0	---	89	---
COC	0.4	0.4	63	35	0	---	90	2
NOP	0.4	0.3	38	35	0	---	75	4
WAE	0.8	0.4	7	12	0	---	78	3
WHB	5.2	2.7	97	3	26	8	89	<1
WHS	0.2	0.2	100	0	100	0	88	2
YEP	1.2	0.6	55	19	0	---	95	2
Gill nets								
BLB	108.5	35.4	7	2	0	---	101	1
BLC	1.0	0.5	50	45	0	---	122	6
BLG	1.3	1.0	75	31	13	24	122	8
CCF	2.2	0.7	100	0	31	24	98	5
COC	1.7	0.9	10	18	0	---	98	4
NOP	0.7	0.3	50	50	0	---	82	4
WAE	5.8	2.5	54	14	6	7	84	1
WHB	2.0	1.5	83	20	25	23	90	4
YEP	11.8	5.7	61	10	0	---	100	1
Electrofishing								
WAE [1]	0.0	---	---	---	---	---	---	---

[1] Fall night electrofishing-WAE; catch rate (CPUE) represents age-0 Walleye/hour

Table 2. Historic mean catch rate (CPUE; gill/frame nets= catch/net night, electrofishing= catch/hour) of stock-length fish for various fish species captured in experimental gill nets, frame nets, and electrofishing in Richmond Lake, 2003-2012. BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; CCF= Channel Catfish; COC= Common Carp; LMB= Largemouth Bass; NOP= Northern Pike; PUS= Pumpkinseed; ROB= Rock Bass; SMB= Smallmouth Bass; WAE= Walleye; WHB= White Bass; WHS= White Sucker; YEP= Yellow Perch

Species	CPUE									
	2003	2004	2005	2006[2]	2007[2]	2008	2009	2010	2011	2012
Frame nets										
BLB	21.2	22.3	2.1	2.8	19.2	1.5	55.8	76.5	39.1	236.3
BLC	24.1	10.5	40.3	64.3	127.2	101.7	58.0	0.7	5.9	8.8
BLG	41.3	55.4	23.8	46.9	43.9	35.2	29.7	60.2	60.7	51.3
CCF	1.9	0.5	0.9	2.1	4.2	1.9	2.2	2.1	0.9	0.1
COC	0.4	0.5	3.3	0.9	1.3	1.9	0.4	0.4	0.1	0.4
LMB	0.1	0.1	0.0	0.2	0.0	0.3	0.0	0.1	0.0	0.0
NOP	0.6	0.1	0.3	0.3	0.2	0.3	0.1	0.7	0.6	0.4
PUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
ROB	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
SMB	0.7	0.5	1.4	1.4	0.6	0.8	0.5	1.0	0.1	0.0
WAE	8.6	13.4	2.6	13.5	1.5	0.7	1.1	1.5	2.2	0.8
WHB	5.8	5.5	2.7	59.7	28.1	14.1	8.1	6.1	17.6	5.2
WHS	0.9	1.1	0.5	1.4	0.8	0.2	0.2	0.1	0.1	0.2
YEP	0.7	0.1	0.3	0.0	0.2	0.4	0.6	0.2	0.9	1.2
Gill nets										
BLB	18.7	2.0	1.3	4.0	6.3	3.5	11.0	12.5	24.7	108.5
BLC	1.3	0.8	4.7	18.4	27.2	61.3	13.0	0.2	0.2	1.0
BLG	1.5	1.0	0.7	1.0	0.2	0.3	0.3	1.5	0.5	1.3
CCF	0.3	0.5	0.7	1.6	2.7	2.5	2.2	1.3	2.2	2.2
COC	0.2	1.8	0.8	7.6	5.5	2.0	0.5	0.3	0.2	1.7
NOP	0.5	0.0	0.0	0.0	0.0	0.3	0.2	3.7	0.7	0.7
WAE	26.2	25.8	10.8	18.0	2.7	1.5	2.3	5.2	8.3	5.8
WHB	2.3	1.5	4.0	29.0	10.2	10.5	2.8	1.3	1.2	2.0
WHS	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2
YEP	7.5	3.8	4.5	0.6	0.8	4.8	3.5	10.7	5.3	11.8
Electrofishing										
WAE [1]	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	34.0	0.0

[1] Fall night electrofishing-WAE; catch rate (CPUE) represents age-0 Walleye/hour
[2] Monofilament gill net mesh size change (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 3. Mean catch rate (CPUE; gill/frame nets= catch/net night), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and relative weight (Wr) for selected species captured in experimental gill nets and frame nets in Richmond Lake, 2003-2012. BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; WAE= Walleye

Species	2003	2004	2005	2006[1]	2007[1]	2008	2009	2010	2011	2012	Objective
Frame nets											
BLB											
CPUE	21	22	2	3	19	2	56	77	39	236	≤ 100
PSD	100	99	97	61	23	93	18	55	81	7	---
PSD-P	28	30	79	41	1	0	0	1	0	0	---
Wr	84	89	84	86	78	89	84	84	84	88	---
BLC											
CPUE	24	10	40	64	127	102	58	1	6	9	≥ 10
PSD	100	76	83	11	13	88	93	67	23	66	30-60
PSD-P	43	66	13	2	2	2	0	8	2	0	5-10
Wr	106	107	117	110	95	106	102	104	99	108	
BLG											
CPUE	41	55	24	47	44	35	30	60	61	51	≥ 25
PSD	99	36	75	82	90	94	82	91	89	78	30-60
PSD-P	47	24	47	22	2	2	19	5	6	17	5-10
Wr	117	108	119	106	102	119	113	117	110	113	---
Gill nets											
WAE											
CPUE	26	26	11	18	3	2	2	5	8	6	≥ 20
PSD	13	24	32	34	81	67	7	10	30	54	10-40
PSD-P	1	1	3	3	44	11	0	0	2	6	< 5
Wr	90	88	90	83	78	83	88	89	90	84	---

[1] Monofilament gill net mesh size change (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 4. Year class distribution based on the expanded age/length summary for Bluegill sampled in frame nets from Richmond Lake, 2008-2012.

	Year Class												
Survey Year	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
2012		193	390	56	240	40		4					
2011	---		70	246	656	73	25	20					
2010	---	---			928	109		47					
2009	---	---	---		62	258	50	162			2		
2008	---	---	---	---		32	3	590	7				

Table 5. Weighted mean TL (mm) at capture for Bluegill sampled in frame nets (expanded sample size) from Richmond Lake, 2007-2012.

	Age							
Year	1	2	3	4	5	6	7	8
2012	119 (193)	172 (390)	189 (56)	200 (240)	207 (40)	---	220 (4)	---
2011	118 (70)	158 (246)	182 (656)	198 (73)	213 (25)	215 (20)	---	---
2010	---	161 (928)	189 (109)	---	215 (47)	---	---	---
2009	90 (62)	160 (258)	194 (50)	200 (162)	---	---	227 (2)	---
2008	100 (32)	148 (3)	179 (590)	201 (7)	---	---	---	---
2007	---	157 (620)	169 (95)	181 (55)	194 (6)	214 (3)	226 (10)	234 (4)

Table 6. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from Richmond Lake, 2008-2012.

| Survey Year | \| Year Class | | | | | | | | | | | | | |
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
2012		2	13		16	5					1			
2011	---	2	8		37	7	2						1	
2010	---	---			17	11	3							
2009	---	---	---		14	7	6							
2008	---	---	---	---		3	3		3		1	1	1	1
# stocked														
fry														
sm. fingerling														
lg. fingerling	10	15	12		4	12	24		33			61	9	

[1] Monofilament gill net mesh size change (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 7. Weighted mean TL (mm) at capture for Walleye age-1 through age-10 sampled in experimental gill nets (expanded sample size) from Richmond Lake, 2005-2012. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

| Year | \| Age | | | | | | | | | | |
	0	1	2	3	4	5	6	7	8	9	10
2012	---	220(2)	309(13)	---	411(16)	454(5)	---	---	---	---	640(1)
2011[1]	129(2)	249(8)	---	361(37)	381(7)	424(2)	---	---	---	---	---
2010	---	---	305(17)	338(11)	370(3)	---	---	---	---	---	---
2009	---	233(14)	263(7)	318(6)	---	---	---	---	---	---	---
2008	---	203(3)	247(3)	---	404(3)	---	432(1)	480(1)	624(1)	495(1)	---
2007[1]	---	205(3)	455(1)	380(5)	522(1)	---	542(1)	493(4)	---	521(1)	---
2006	---		329(60)	427(1)	411(3)	427(17)	470(7)	634(1)	593(1)	---	---
2005[1]	---	245(47)	---	300(1)	375(39)	434(4)	---	564(1)	495(1)	---	---

[1] Older walleye were sampled, but are not reported in this table

Table 8. Stocking history including size and number for fishes stocked into Richmond Lake, 1999-2012. CCF= Channel Catfish; WAE= Walleye

Year	Species	Size	Number
2000	CCF	large fingerling	25,000
	WAE	large fingerling	9,285
2001	WAE	large fingerling	60,984
2004	WAE	large fingerling	32,535
2006	WAE	large fingerling	23,828
2007	WAE	large fingerling	11,766
2008	WAE	large fingerling	4,218
2010	WAE	large fingerling	11,788
2011	WAE	large fingerling	15,240
2012	WAE	large fingerling	10,173

Table 9. Year class distribution based on the expanded age/length summary for Yellow Perch sampled in gill nets from Richmond Lake, 2011-2012.

| | Year Class | | | | | | | | |
Survey Year	2012	2011	2010	2009	2008	2007	2006	2005	2004
2012		11	20	38					
2011	---		3	26	2				1

Table 10. Weighted mean TL (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from Richmond Lake, 2011-2012.

| | Age | | | | | | |
Year	1	2	3	4	5	6	7
2012							
Male	145 (1)	190 (8)	213 (11)	---	---	---	---
Female	150 (8)	196 (12)	217 (27)	---	---	---	---
Combined	148 (11)	194 (20)	216 (38)	---	---	---	---
2011							
Male	154 (1)	188 (8)	233 (2)	---	---	---	---
Female	146 (2)	197 (18)	---	---	---	---	297 (1)
Combined	149 (3)	194 (26)	233 (2)	---	---	---	297 (1)
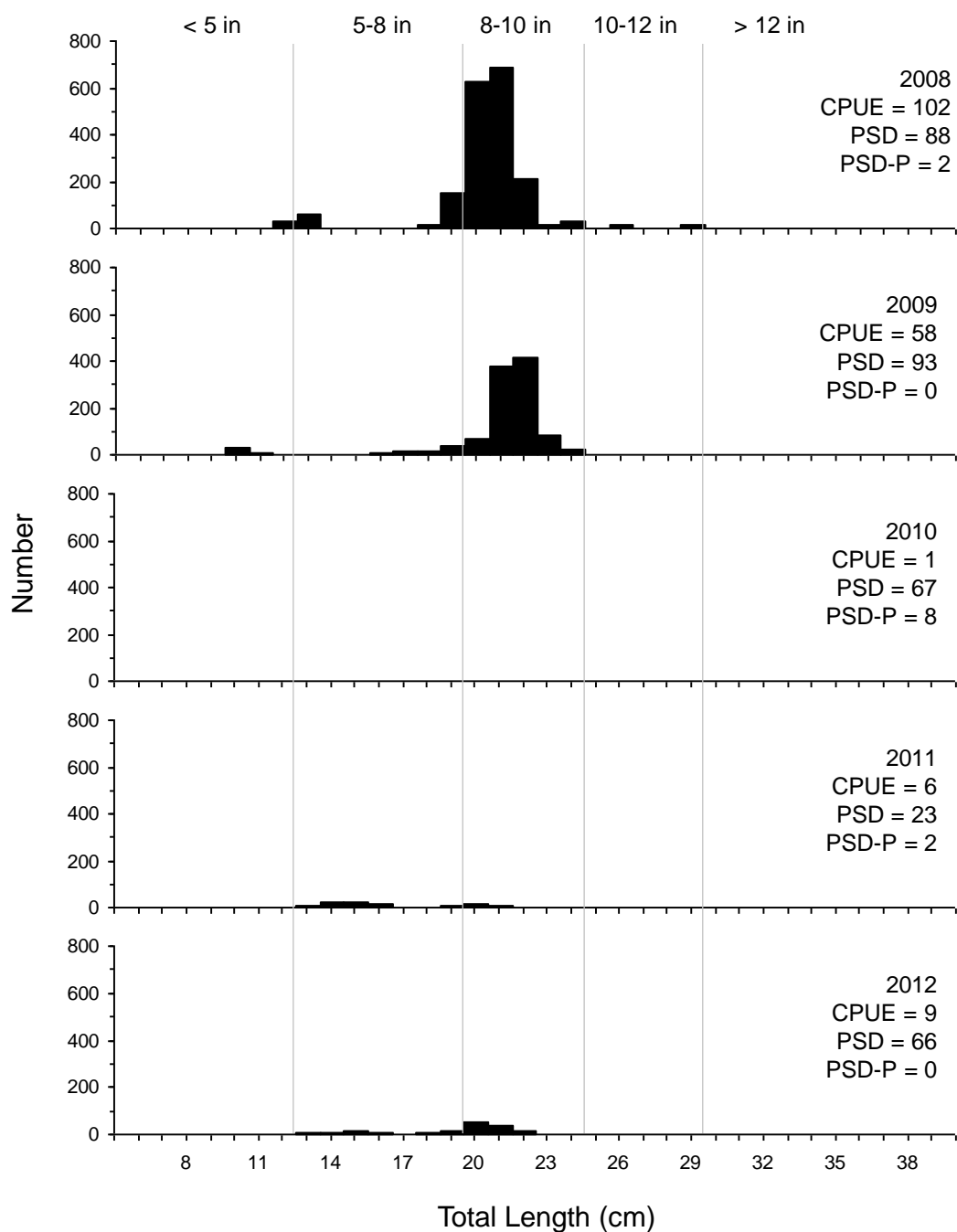
Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Black Crappie captured using frame nets in Richmond Lake, 2008-2012.
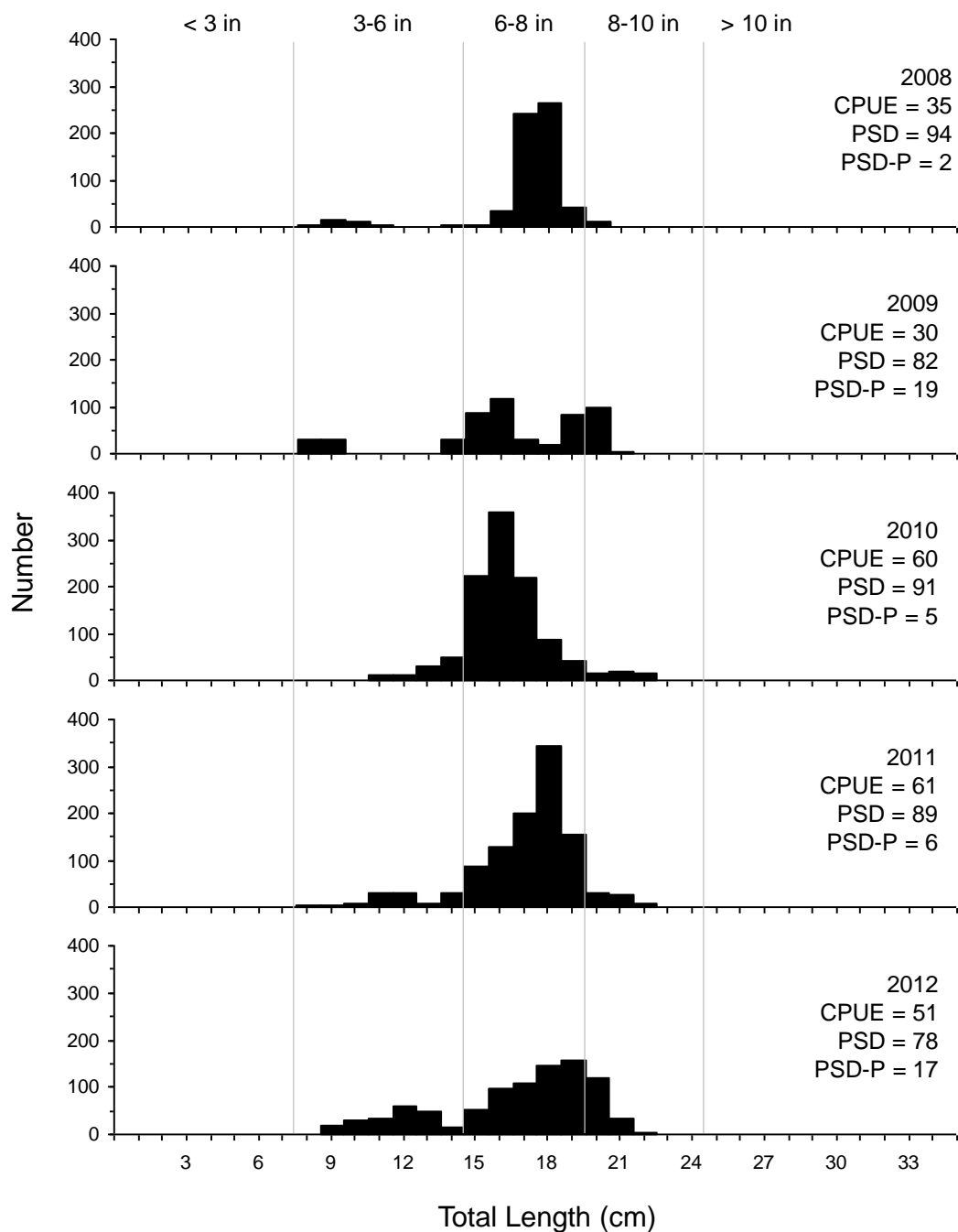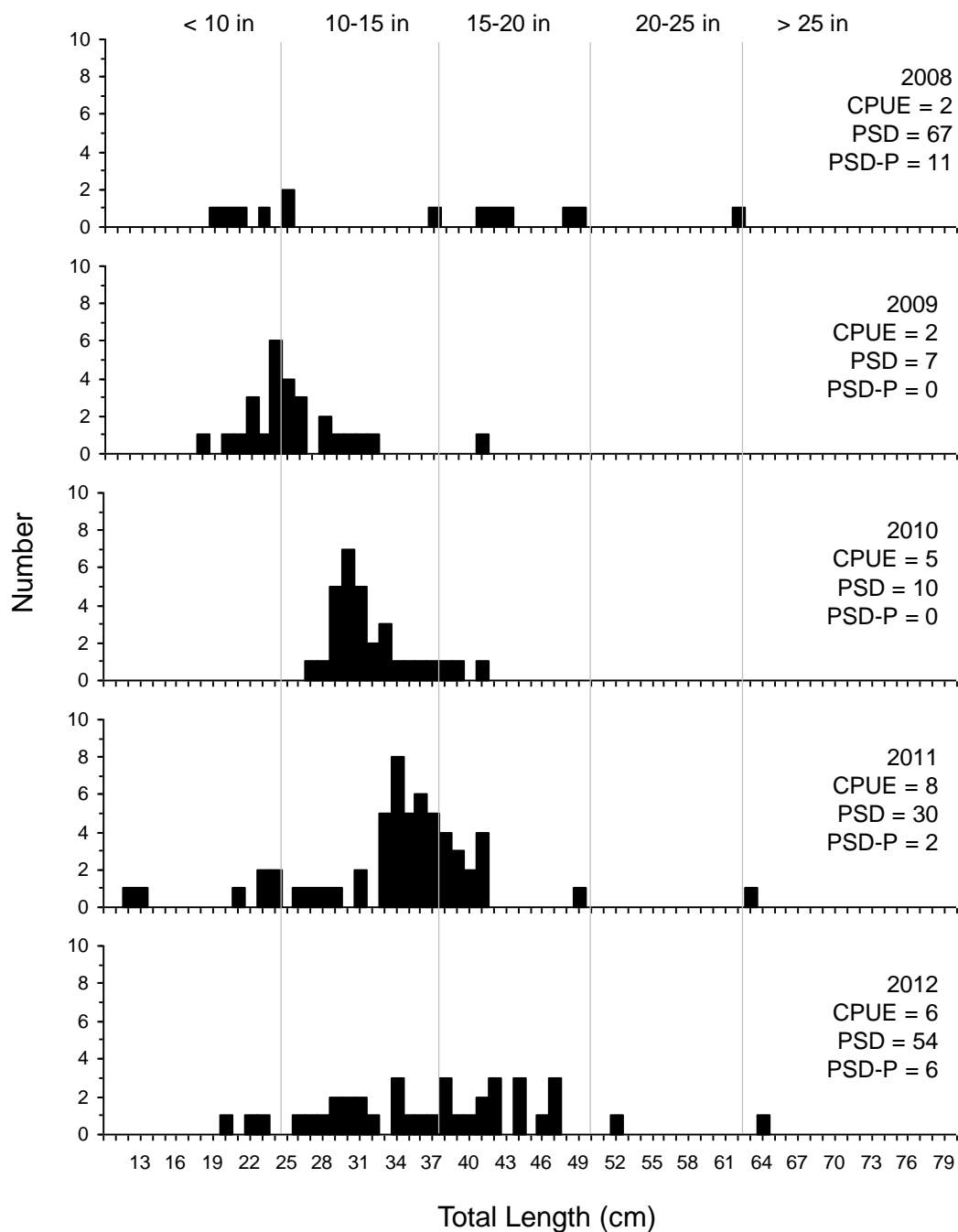
Richmond Lake

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Bluegill captured using frame nets in Richmond Lake, 2008-2012.

Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using gill nets in Richmond Lake, 2008-2012.
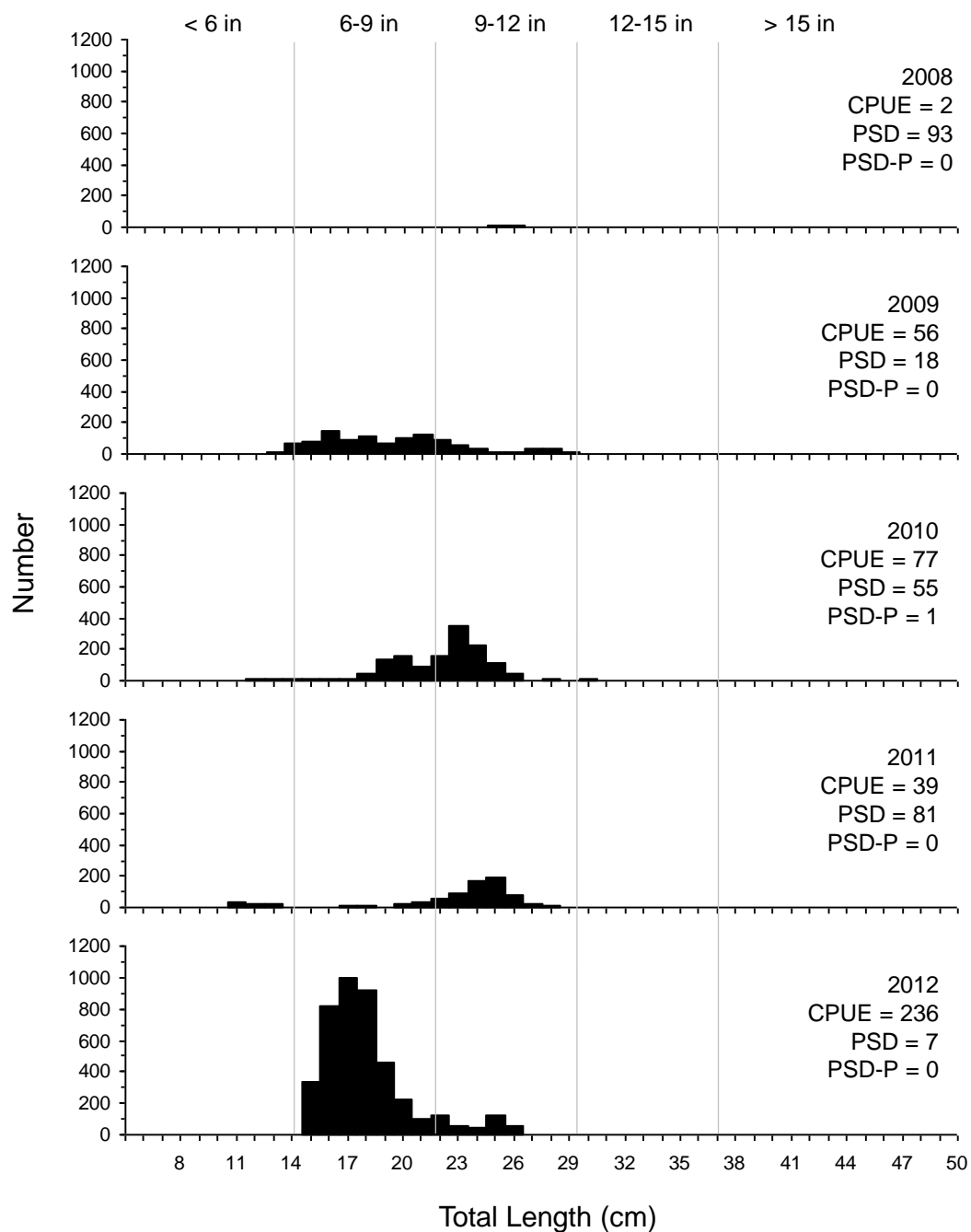
Richmond Lake

Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Black Bullhead captured using frame nets in Richmond Lake, 2008-2012.
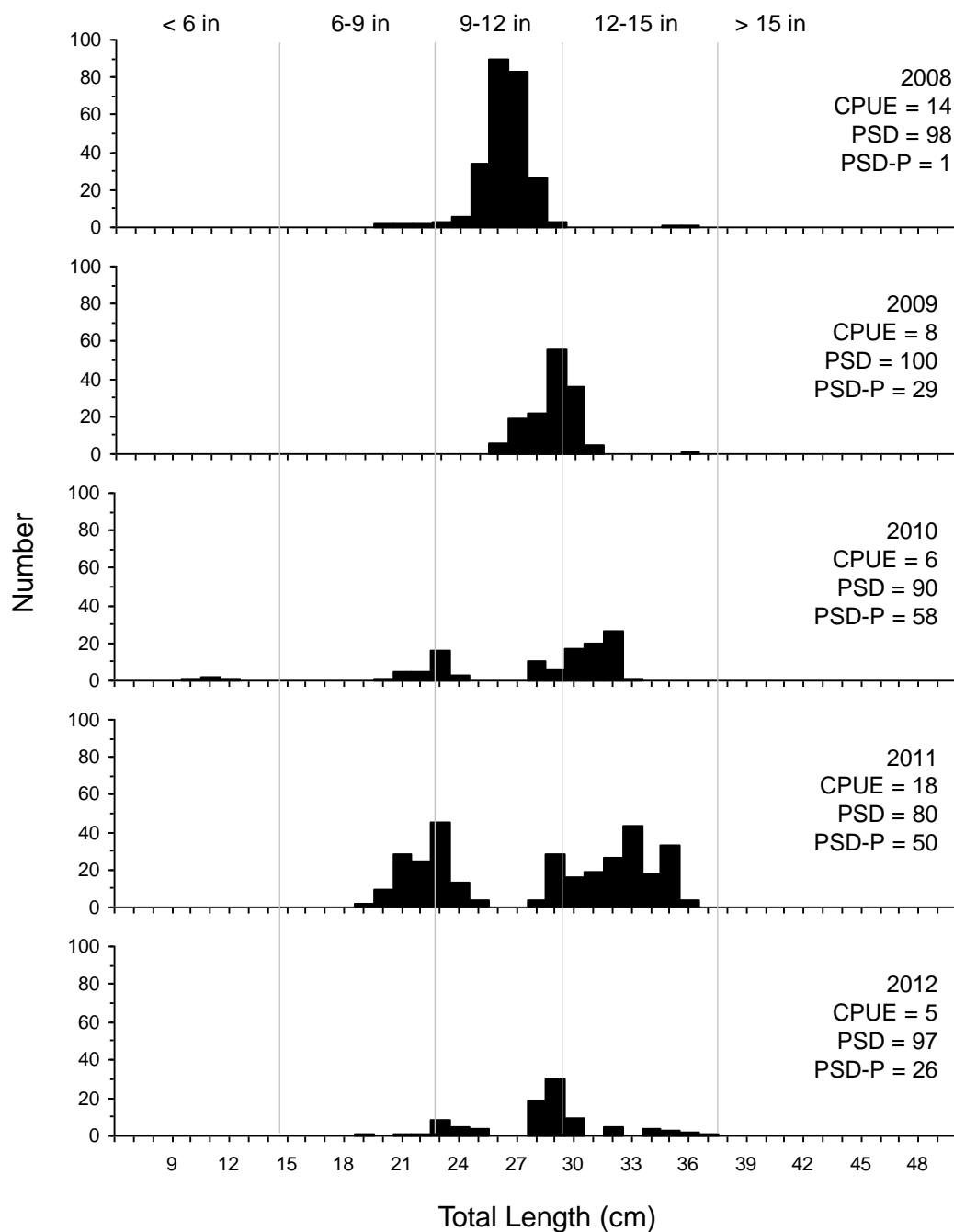
Figure 7. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for White Bass captured using frame nets in Richmond Lake, 2008-2012.
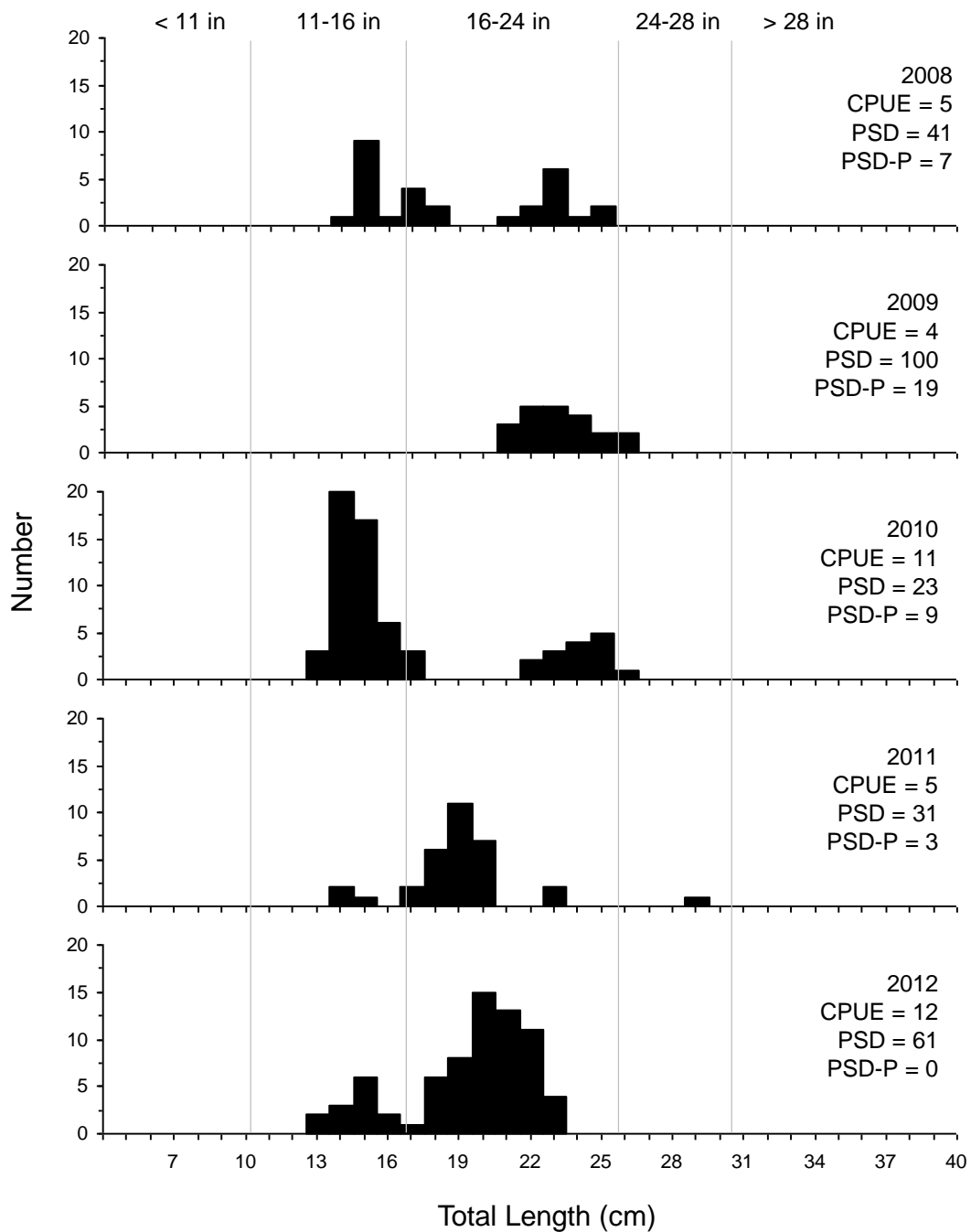
Richmond Lake

Figure 8. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using gill nets in Richmond Lake, 2008-2012.